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A NEW GENUS OF IASSINAE FROM SOUTHEASTERN BRAZIL (HOMOPTERA: CICADELLIDAE)

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Abstract.—The Neotropical leafhopper ***Hoplojassus brasiliensis*** Dietrich, new genus, new species, is described, illustrated, and placed in the nominate tribe of the cicadellid subfamily Iassinae. *Hoplojassus* resembles other Iassini in overall shape and genital morphology, but certain features of the head, forewing, and leg are similar to those found in other cicadellid subfamilies. The unique combination of ancestral and derived features found in the new genus suggests that it represents a plesiomorphic lineage distinct from other Iassinae. The difficulties encountered in placing this genus accentuate the need for a revised higher classification of the Cicadellidae.

Key Words: Leafhopper, morphology, phylogeny, Penthimiinae, Hylicinae

The leafhopper species described herein keys to *Goblinaja* Kramer in Blocker's (1979a) key to New World genera of Iassini (as Iassinae), but differs considerably from this and all other described Iassinae. The unique combination of character states found in this species, represented by one male and two female specimens from southeastern Brazil, warrants its formal description and placement in a new genus.

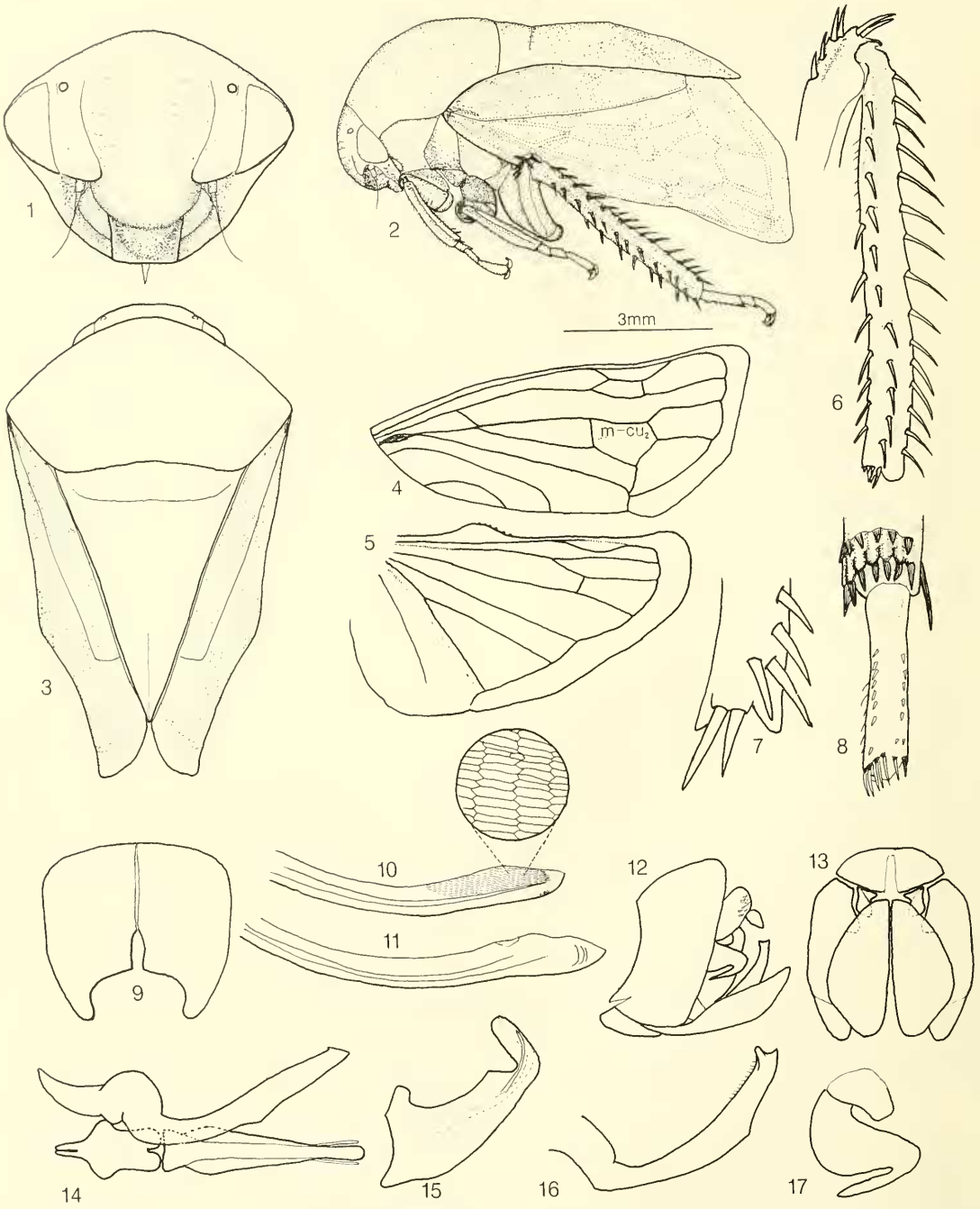
Terminology for wing venation and leg chaetotaxy follows Evans (1946) and Davis (1975), respectively.

Hoplojassus Dietrich, New Genus
Figs. 1–17

Type species: Hoplojassus brasiliensis Dietrich, new species, by monotypy.

Diagnosis.—This genus is easily recognized by its large, robust form; and by its greatly enlarged scutellum, which surpasses the apex of the anal margin of the forewing at rest.

Description.—Head (Figs. 1, 2). Face, in anterior view, about half as wide as pronotum, evenly convex, without transverse striae, crown not differentiated; beak extended slightly beyond posterior margin of mesosternum; clypellus rectangular, gibbous medially, apex truncate, even with ventral margins of gena; transclypeal suture incomplete; lora flat, distance from lorum to antennal pit about half length of lorum; gena not strongly produced laterally, lateral margin weakly sinuate, largely concealing proepisternum; antenna short, length of flagellum less than half width of head; antennal ledge well developed, apex free, obliquely rounded, overlapping frontoclypeus; frontoclypeus convex, lateral margin not produced over antenna, muscle scars well developed, sulcate; postfrontal sutures slightly divergent, then curved mesad and fading near level of ocelli; coronal suture absent; weak groove present laterad of ocellus; ocelli on face near anterodorsal corners of eyes. Thorax. Pronotum (Figs. 2, 3) strongly convex, transverse striae very weak, lateral margin sharply carinate, posterior margin weakly emarginate. Scutellum (Figs.



Figs. 1–17. 1–11. *Hoplojassus brasiliensis*, **n. gen., n. sp.**, ♀ paratype (Corupa, Brazil): 1, head, anterior view; 2, habitus, lateral view; 3, same, dorsal view; 4, right forewing; 5, right hindwing; 6–8, left metathoracic leg—6, tibia and apex of femur, ventrolateral view; 7, apex of femur, dorsal view; 8, 1st tarsomere and apex of tibia, ventral view; 9, abdominal sternum VII; 10, 1st valvula, apical half, lateral view (detail of dorsal sculpturing enlarged); 11, 2nd valvula, apical half, lateral view. 12–17, holotype ♂ genitalia: 12, genital capsule, lateral view; 13, same, ventral view; 14, aedeagus, left style, and connective, posteroventral view; 15, aedeagus, lateral view; 16, style, lateral view; 17, hook of abdominal segment X, lateral view.

2, 3) large, posterior half keeled medially, impressed and irregularly rugose laterally, apex slightly surpassing apex of anal margin of forewing at rest. Forewing (Figs. 2–4) amber hyaline, without punctures or setae, with weak transverse fold on costal margin slightly distad of vein R_1; clavus broad, apex truncate; appendix broad, extending from claval apex to wing apex, then narrowed on costal margin; vein M_{1+2} absent; crossvein m-cu_1 short, M and Cu nearly contiguous near base; crossvein m-cu_2 present or absent, when present connected to Cu basad or distad of fork of Cu (cf. Figs. 2 and 4); forewing apices at rest not overlapped. Hind wing (Fig. 5) hyaline, crossvein r-m present, R_{4+5} and M_{1+2} not contiguous preapically; costal margin strongly arcuate near base; vannal fold closely paralleling Cu_2, not divergent toward wing margin; submarginal vein not continuing onto jugum. Legs. Prothoracic femur not flattened, with 2 apical and 2 preapical macrosetae, ventral setae scattered, rows weakly differentiated; tibia not flattened, row I carinate, rows I and II without preapical macrosetae, rows III and IV with 3 and 1 macroseta respectively. Mesothoracic femur with 2 apical macrosetae, ventral setae scattered, rows undifferentiated; tibial rows I and II without macrosetae, row I carinate, rows III and IV each with 3 or 4 macrosetae. Metathoracic femur (Figs. 6, 7) compressed, macrosetae 2:2:1:1, all subequal in size, situated on apical prominence; tibia (Figs. 6, 8) bowed laterad in ventral view, weakly twisted longitudinally, rows I–IV with approximately 15, 11, 7, and 3 black macrosetae, respectively, cucullate intercalary setae absent, row IV with about 20 smaller setae basad of, and interspersed among, preapical macrosetae, apical groups II and IV each with 1 macroseta, pecten (Fig. 8) with 6–7 non-cucullate macrosetae in preapical row and 5–6 cucullate macrosetae in apical row. Metathoracic tarsomere I (Fig. 7) as long as II and III combined; plantar surface with 2 widely spaced rows of small, non-cucullate setae; ventroapical row of cucullate setae oblique; dorsoapical setae absent. Female abdomen. Sternum VII (Fig. 9) 3× longer than sternum VI, with median longitudinal membranous cleft, apex emarginate, apicolateral margin produced into rounded lobe. Pygofer evenly clothed along apical and ventrolateral margin with setae of various widths, large macrosetae absent; base produced dorsomesally, ensheathing rami of 2nd valvulae. 1st and 2nd valvulae strongly united and difficult to separate, in lateral view, slender and evenly curved. 1st valvula (Fig. 10) with elongate-alveolate sculpturing dorsoapically; base in ventral view broad, heavily sclerotized except for small medial fenestra (hyaline area), mesal margin with horizontally oriented triangular dorsal flap. 2nd valvula (Fig. 11) with dorsal margin sinuate preapically, without teeth or serrations, preapical dorsal membranous area weak, apex with a few transverse striae; base of ramus extending caudad beyond connection with 2nd valvifer. Male genitalia. Genital capsule partially retracted into abdominal segment VIII, base of subgenital plates concealed; sternum VIII 2× longer than sternum VII. Pygofer (Figs. 12, 13) short, basolateral cleft weak, ventrolateral hooks absent; dorsoapical lobe present, articulated by flexible membranous hinge, broadly rounded, with several small macrosetae preapically. Segment X strongly sclerotized dorsally, membranous ventrally; ventrolateral hook (Figs. 12, 17) well developed, strongly sigmoid, tapered, apex in ventral view directed anterolaterad. Valve (Fig. 13) well developed, triangular, not fused to pygofer, with median longitudinal membranous cleft. Subgenital plates (Fig. 13) large, strongly constricted basally, obliquely ovoid apically, venter evenly clothed with coarse setae, macrosetae not differentiated, pseudostyles absent. Connective (Fig. 14) strongly sclerotized, with six lobes—two lateral, articulated with styles, two narrow anterior, and two broad posterior. Style (Figs. 14, 16) large, elongate; apodeme slender, sigmoid basally; shank

curved dorsolaterad, ventral margin with angulate prominence near midlength, apex in lateral view concavely emarginate, dorsal margin with band of fine, short setae. Aedeagus (Figs. 14, 15) compressed; shaft tapered, directed posterodorsad, with lateral pair of long, slender, apically directed processes arising at apical ⅓; apex strongly recurved, rounded; anterodorsal margin with angulate prominence preapically; gonopore posteroapical. Integumental sculpturing. Body and wings largely glabrous, fine reticulate sculpturing present on legs; fore- and hind wing apices granulose.

Hoplojassus brasiliensis Dietrich, New Species
Figs. 1–17

Type locality: Rio de Janeiro, Brazil [Carnegie Museum, Pittsburgh, PA, USA].

Description.—Structural features as described for genus. Coloration. Dark reddish orange marked with black; venter of head, pro- and mesothoracic coxae, mesal areas of thoracic sterna, episterna, and metathoracic coxa, and macrosetae of legs black, male pronotum with small medial pair and larger lateral pair of black metopidial maculae; basal tarsomeres of legs yellow; forewing reddish hyaline basally with a few yellowish spots, apical half amber colored with brown apical macula. Genitalia. As described for genus. Measurements (mm). Length including forewing, ♂7.0, ♀8.3; pronotum width, ♂4.0, ♀4.9; head width, ♂2.1, ♀2.6; head height, ♂1.9, ♀2.0; forewing length, ♂5.6, ♀7.0; forewing width, ♂2.1, ♀2.9; prothoracic tibia length, ♂1.4, ♀1.6; mesothoracic tibia length, ♂1.6, ♀1.9; metathoracic tibia length, ♂3.9, ♀4.0; metathoracic tarsus length, ♂1.6, ♀1.7; ovipositor length, 4.1; subgenital plate length, 1.3.

Material examined.—Holotype ♂ labeled: "Rio de Jan./ Brazil/ Acc.-No. 2066; Oct.; Holotype/ Hoplojassus/ brasiliensis/ Dietrich"; ♀ paratype, same locality, Acc.-No. 2966, November. [Carnegie Museum, Pittsburgh, PA, USA]; one additional ♀ paratype, Corupa (Hansa Humbolt), Santa Catarina, Brazil, November, 1944, A. Maller, Coll., Frank Johnson, Donor [U.S. National Museum, Washington, DC, USA].

Discussion

Placement of *Hoplojassus* in an appropriate family-group taxon is difficult, in part because different authors have recently proposed different classifications. Linnavuori and Quartau (1975) included the tribes Iassini, Scarini (as Gyponini), and Krisnini (and four other exclusively Old World tribes) in the subfamily Iassinae. Synapomorphies supporting the monophyly of this subfamily have not been found. The apical fusion of hind wing veins R_{3+4} and M_{1+2} (Evans 1947) unites the cosmopolitan tribe Iassini with the Old World tribes Hyalojassini, Platyjassini, Reuplemellini, and Trocnadini, but this feature is absent among the Krisnini (mostly Old World), Scarini (New World), and Selenomorphini (New Caledonia), and exceptions occur among the New World Iassini (*Scaroidana* Osborn, *Pachyopsis* Uhler). Blocker (1979a, b) and other authors have considered the New World tribes to represent separate subfamilies. Hamilton (1983) suggested that the subfamily Iassinae (sensu Linnavuori and Quartau 1975) is polyphyletic, and removed all but the nominate tribe to a separate subfamily. This classification is contradicted by the hind wing feature mentioned above, and has not been followed by other authors (Blocker and Webb 1990, Oman et al. 1990). Blocker and Webb (1990) concluded that a reclassification of iassine family groups is needed, but thus far, none has been attempted. For convenience, I follow the classification of Linnavuori and Quartau (1975).

The ligulate subgenital plates, enlarged male sternum VIII, and partially retracted male genital capsule of *Hoplojassus* suffice to place the genus in the subfamily Iassinae (sensu Linnavuori and Quartau 1975). These presumably apomorphic features also occur among species of the Ledrinae and Hylici-

nae, but the former have three apical macrosetae on the hind femur, and the latter have the body densely clothed with scales or setae, putative synapomorphies lacking in *Hoplojassus* and other Iassinae.

The robust form and evenly convex head of *Hoplojassus* suggest that it is most appropriately placed in the tribe Iassini (= Iassinae sensu Blocker 1979a, b). This placement is also supported by the morphology of the female genitalia. As in other Iassini (Hill 1970), the ovipositor of *Hoplojassus* is long, narrow, and sword shaped. The ovipositors of the Scarini, the only other iassine tribe of widespread occurrence in the New World, are broad medially (Hill 1970). The new genus differs from other Iassini in lacking well-defined dorsal teeth on the 2nd valvula, and the alveoles of the dorsal sculpturing of the 1st valvula are more elongate (Fig. 10) than those illustrated for *Jassus lanio* (L.) by Hill (1970).

In overall shape, *Hoplojassus* resembles the New World genera *Gargaropsis* Fowler and *Baldriga* Blocker. But unlike these genera, *Hoplojassus* retains a number of features thought to be primitive (Blocker 1979b). These include: 1) vertex without spots; 2) vertex not produced medially; 3) forewing vein separating appendix and 1st apical cell complete; 4) ventral margin of pygofer without dense row of setae; (5) subgenital plates broad, without pseudostyles; 6) style elongate; 7) aedeagus without apical processes; 8) pygofer margins parallel; 9) genital capsule only partially retracted into abdominal segment VIII; 10) subgenital plates not reduced. Additionally, *Hoplojassus* has hindwing veins R_{3+4} and M_{1+2} separate throughout their length. Among other New World Iassini, this feature occurs only in *Scaroidana* and *Pachyopsis* (and possibly *Scaropsia* Blocker), genera that Blocker (1979b) placed at the base of his cladogram.

Among the 26 apomorphies listed by Blocker (1979b) for genera of Iassini, *Hoplojassus* has five: 1) head narrower than pronotum; 2) forewing without setae; 3) male abdominal sternum VII 2× longer than sternum VI; 4) abdominal segment X with hooks; 5) ventrolateral pygofer hooks absent.

Placement of *Hoplojassus* on Blocker's (1979b) cladogram based on any of these features would require additional homoplasy. The presence of numerous plesiomorphies that are absent in most Iassini generally supports the placement of the new genus near the base of Blocker's cladogram. However, the presence of hooks on abdominal segment X suggests a relationship to the highly derived genera *Penestragania* and *Mogenola,* and the elongate male abdominal sternum VIII would place the new genus near *Garlica.* Such contradictory evidence suggests that the phylogenetic relationships among New World Iassini need reassessment.

Some features present in *Hoplojassus* that are unusual or unique among Iassinae may be plesiomorphic for the subfamily. Blocker (1979b) suggested that reduction in the number of hind femoral macrosetae occurred in the evolution of the Iassini; primitive genera have setal formula 2:2:1 and derived genera have setal formula 2:1:1, 2:1, or 2:0. In *Hoplojassus,* the macrosetal formula of the hind femur is 2:2:1:1. This formula is rare among other Iassinae, occurring only in the genera *Sulcana* DeLong and Freytag and *Coelogypona* DeLong and Freytag (tribe Scarini), but is common among species of other cicadellid subfamilies (e.g. Hylicinae and Penthimiinae). If Blocker's (1979b) polarization of this character is correct, then *Hoplojassus* may be among the most plesiomorphic taxa of the subfamily Iassinae.

Certain features of the head and wings of *Hoplojassus* are shared with the subfamilies Penthimiinae and Hylicinae. The ocelli of *Hoplojassus* are situated much more dorsolaterally than those of other iassines. The forewing of the new genus bears a transverse preapical fold and has a broad appendix that

extends to the costal margin. These features are apparently absent among other Iassinae but occur frequently among the Penthimiinae and Hylicinae. In one specimen (USNM) of *H. brasiliensis,* crossvein m-cu_2 connects to the anterior branch of Cu, a striking resemblance to the usual venation of the Hylicinae. Presence of an abrupt transition between the reddish dorsal and black ventral parts of the head in *Hoplojassus* is similar to the usual condition in the Penthimiinae. An elongate scutellum is also present among the Penthimiinae (e.g. *Haranga* Distant) and Hylicinae (e.g. *Balala* Distant, *Sudra* Distant); but the scutellum of *Hoplojassus* is considerably more elongate than that of any other known leafhopper.

Despite these apparent affinities, *Hoplojassus* differs greatly from the subfamilies Penthimiinae and Hylicinae in the structure of the female genitalia (Hill 1970). The new genus also differs from other Iassinae in having the apex of the scutellum surpassing the apex of the anal margin of the forewing at rest, and in lacking forewing vein M_{1+2}. Thus, *Hoplojassus* may represent a lineage distinct from described cicadellid family-groups. Nonetheless, placement in the tribe Iassini, based on the similarly shaped head and genitalia (possibly plesiomorphic similarity), seems appropriate until the phylogenetic relationships among the tribes and subfamilies of Cicadellidae are more clearly understood.

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